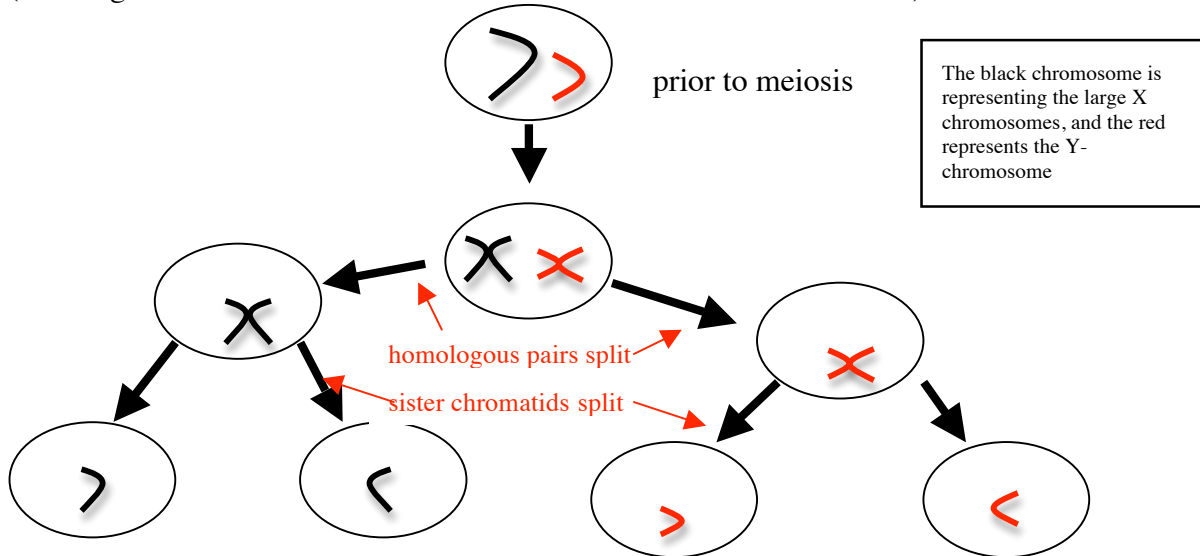


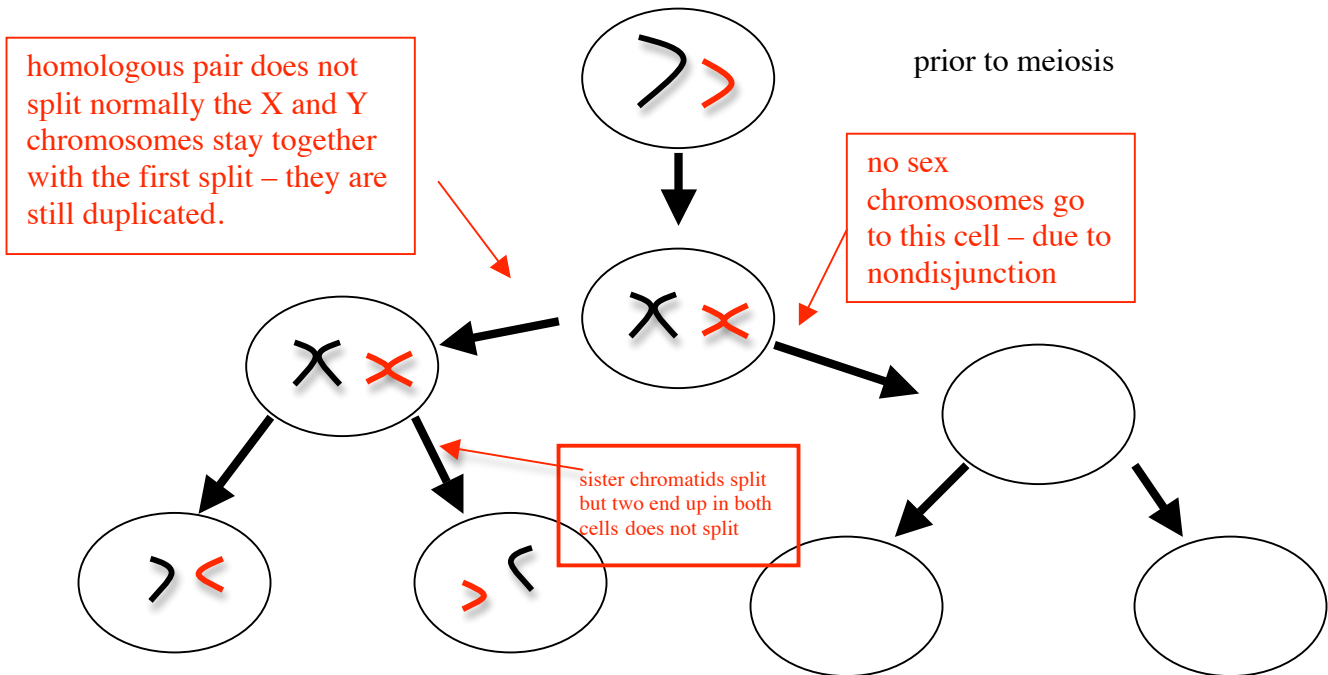
Worksheet on non-disjunction:

(a) Fill in the cells below showing the **NORMAL** process of meiosis of the male's sex chromosomes (The large black chromosome is the X and the smaller red one is the Y). **DO NOT** show crossing over.



$\frac{1}{2}$ of the gametes will have the X chromosome and $\frac{1}{2}$ of the gametes will have a Y chromosome. Remember we are only showing the sex chromosomes, and there would be 22 other chromosomes in each of the gametes.

(b) Fill in the cells below showing the process of meiosis of the male's sex chromosomes with **non-disjunction occurring during meiosis I**. **DO NOT** show crossing over.

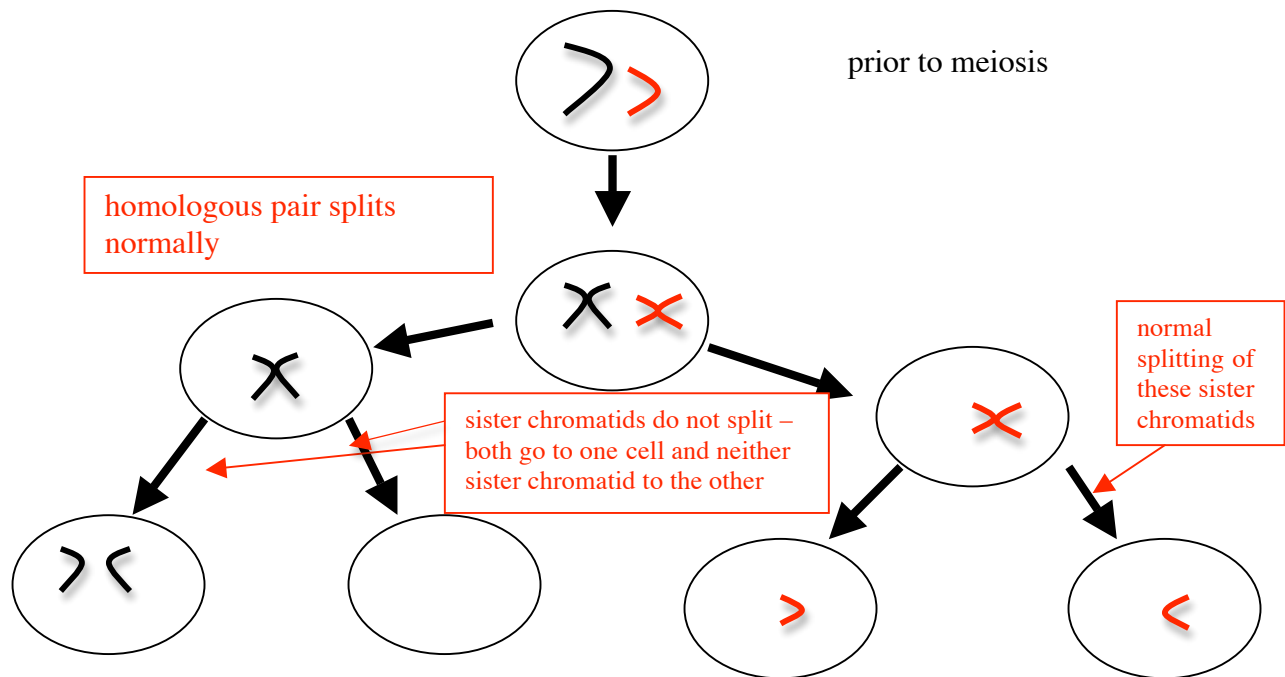


What are the possible abnormal gametes the male can produce with non-disjunction occurring in Meiosis I? **All gametes are abnormal** – ½ will have an extra chromosome – having **BOTH AN X and Y chromosome**, and ½ will have **NO SEX CHROMOSOMES** – shown as a blank cell.

Could this man father a Turner syndrome (XO) child? Could this man father a Klenfelter's syndrome child (XXY)?

Yes to the Turner's syndrome, and yes to the Klenfelter's syndrome (contributing an abnormal XY gamete).

(c) Fill in the cells below showing the process of meiosis of the male's sex chromosomes with **non-disjunction occurring during meiosis II**. **DO NOT** show crossing over.



What are the possible abnormal gametes the male can produce with non-disjunction occurring in Meiosis II? ½ abnormal gametes -- **XX and O (no sex chromosome)** – ½ normal gametes – **only one Y chromosome**.

Could this man father a Turner syndrome (XO) child? Could this man father a Klenfelter's syndrome child (XXY)?

Yes to the Turner's Syndrome, donating a gamete with no sex chromosome. Yes to the XXY individual IF THE non-disjunction occurred in the mother (this male could contribute a normal Y gamete) – but if the egg was normal, than no this man (with non-disjunction in meiosis II) could not have fathered the child, since none of his gametes would be XY (and the Y has to come from the male).